

CLAIMS

WE CLAIM:

1 1. A reconfigurable thin-film-filter-based dense wavelength division
2 multiplexing (DWDM) device, comprising:

3 a dual fiber collimator having an input port for receiving an input optical
4 signal and a reflection output port;

5 a single fiber collimator having a transmission output port; and

6 a thin film filter located between the dual fiber collimator and the single
7 fiber collimator, the thin film filter having a first face and a second face, the first face of
8 the thin film filter having an upper one-half and a lower one-half, the lower one-half of
9 the first face in the thin film filter being coated with a reflective material.

1 2. The DWDM device of Claim 1, wherein the thin film filter has a first
2 position such that a wavelength of the input optical signal travels through the dual fiber
3 collimator, the upper one-half of the first face in the thin film filter, and the single
4 collimator in generating an output optical signal at the transmission output port.

1 3. The DWDM device of Claim 2, wherein the thin film filter has a second
2 position such that the input optical signal travels through the dual fiber collimator,
3 projects into the lower one-half of the first face in the thin film filter having the reflective
4 material, thereby the input optical signal is reflected back through the dual fiber
5 collimator to the reflection output port.

1 4. The DWDM device of Claim 2, further comprising a mechanical relay for
2 moving the thin film filter to the first position.

3 5. The DWDM device of Claim 3, further comprising a mechanical relay for
4 moving the thin film filter n film filter to the second position.

1 6. The DWDM device of Claim 1, wherein the reflective material of the
2 lower one-half in the first face of the thin film filter comprises gold.

1 7. The DWDM device of Claim 1, wherein the reflective material of the
2 lower one-half in the first face of the thin film filter is coated with a metal or an oxide.

1 8. A reconfigurable device, comprising:
2 an input port for receiving a light signal;
3 a thin film filter having a first face and a second face, the first face of the
4 thin film filter having an upper surface area and a lower surface area, wherein the upper
5 surface area is thin film coated for passing through a wavelength of the light signal and
6 the lower surface area is coated with a reflective material for blocking and reflecting the
7 light signal.

1 9. The reconfigurable device of Claim 8, further comprising a dual fiber
2 collimator coupled between the input port and the thin film filter, the dual fiber collimator

3 coupled to the input port for receiving the light signal and having a reflection port for
4 receiving the reflected light signal.

1 10. The reconfigurable device of Claim 9, further comprising a single fiber
2 collimator for receiving the wavelength of light signal from the thin film filer and
3 transmitting the light signal to a transmission output port.

1 11. The reconfigurable device of Claim 8, wherein the reflective material of
2 the lower surface area in the first face of the thin film filter comprises gold.

1 12. The reconfigurable device of Claim 8, wherein the reflective material of
2 the lower surface area in the first face of the thin film filter comprises a metal or an oxide.

1 13. The reconfigurable device of Claim 8, further comprising a mechanical
2 relay for moving the thin film filter to a first position for passing through the wavelength
3 of light signal through the upper surface area in the first face of the thin film filter.

1 14. The reconfigurable device of Claim 8, further comprising a mechanical
2 relay for moving the thin film filter to a second position such that the light signal is
3 reflected back from the lower surface area of the first face in the thin film filter.

1 15. A hitless thin film filter; comprising:

2 a thin film filter having a first face and a second face, the first face having an
3 upper surface and a lower surface; and

4 a reflective material coated onto the lower surface of the first face in the thin film
5 filter, wherein the reflective material has a thickness t in which the thickness t affects the
6 intensity of a light beam that is projected at a cross junction of the thin film filter, the
7 cross junction of the thin film filter being located between the upper surface and the lower
8 surface.

1 16. The hitless thin film filter of Claim 15, wherein intensity of the light is
2 governed by the following equation: $t(\sin\theta) = n\lambda$, wherein the angle θ denotes the
3 incident angle of light, the symbol λ denotes a particular wavelength and the symbol n
4 denotes an integer or fractional number.

1 17. The hitless thin film filter of Claim 16, wherein:

2 if $n = 0, 1, 2, \dots$ $I = I_{\max} = I_0$

3 If $n = \frac{1}{2}$ $I = I_{\min} = 0$

1 18. A reconfigurable add-drop optical system, comprising:
2 a first thin film filter chip having a first face and a second face, wherein
3 the first face of the first thin film filter chip is partially coated with a thin film and is
4 partially coated with a reflective material; and

5 a second thin film chip, coupled to the first thin film chip, having a first
6 face and a second face, wherein the first face of the second thin film filter chip is partially
7 coated with a thin film and partially coated with a reflective material.

1 19. The reconfigurable add-drop optical system of Claim 18, further
2 comprising a third thin film chip, coupled to the second thin film chip, having a first face
3 and a second face, wherein the first face of the third thin film filter chip is partially coated
4 with thin film and partially coated reflective material.

1 20. The reconfigurable add-drop optical system of Claim 18, further
2 comprising:

3 a dual fiber collimator coupled to the first thin film chip, the dual fiber
4 collimator having an input port and a reflection output port; and

5 a single fiber collimator coupled to the first thin film chip, the single fiber
6 collimator having a transmission output port.

1 21. The reconfigurable add-drop optical system of Claim 18, further
2 comprising:

3 a first dual fiber collimator coupled to the first thin film chip, the dual
4 fiber collimator having an input port and an output reflection/add port; and

5 a second dual fiber collimator coupled to the first thin film chip, the single
6 fiber collimator having a transmission output port and an input add port.

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1 22. A reconfigurable thin-film-filter-based dense wavelength division
2 multiplexing (DWDM) device, comprising:
3 a first dual fiber collimator having an input port for receiving an input
4 optical signal and a output reflection/add port;
5 a second dual collimator having an output transmission port and an input
6 add port; and
7 a thin film filter located between the first dual fiber collimator and the
8 second dual fiber collimator, the thin film filter having a first face and a second face, the
9 first face of the thin film filter having an upper one-half and a lower one-half, the lower
10 one-half of the first face in the thin film filter being coated with a reflective material.